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FORM TOOL
[FORMWERKZEUG]

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Description

The invention relates to a form tool, and especially a multi-part drawing tool, according to the preamble of Claim 1.

For forming bleached parts in motor vehicle building, using drawing tools of gray cast iron is known, which have long service lives with numbers of units typically on the order of magnitude of 0.5 million. If gray cast iron tools of this type are provided with a chrome coating, the service lives can even be increased up to about double. However, such form tools are expensive to manufacture.

In contrast, drawing tools of fine zinc alloys (Zamak), have significantly shorter service lives and therefore can only be used for the prototype area with quantities of a few hundred parts - depending on the sheet metal type.

As a consequence, there is an on-going need for a form tool that can be manufactured cost-effectively for the medium series production range, i.e., for quantities of up to more than 10,000 formed parts, as are necessary in automotive building for special models or niche vehicles.

Therefore, the object of this invention is to produce a form tool of the type named at the beginning that can be manufactured at low expense and still have a service life that is adequately long for the medium series production range.

According to the invention, this object is achieved by the form tool characterized in Claim 1.

According to the invention, the service life of a form tool consisting of fine zinc alloy can be increased considerably by using the claimed material combination with a surface coating containing chrome, namely by at least ten-fold, even if the layer thickness of the surface coating is only a few μm , so that even higher-strength sheet steel in the medium series production range can be formed with no problems with a single drawing tool, but the tool costs are far lower than for the Zamak tools used for a series size such as this or for a comparable gray cast iron tool.

In an especially preferred method of manufacturing, the surface coating is applied according to Claim 2 using galvanic means and namely with a coating thickness of 10 to 15 μm as preferred according to Claim 3.

For reasons of increased wear resistance of the surface coating, according to Claim 4 it preferably contains a pure chrome content of more than 90%, whereby a hardness grade to over 70 Rockwell can be achieved.

In another especially preferred design of the invention, the lubricant requirement needed for a high-quality forming process is significantly reduced in that the surface coating has a microrough surface structure according to Claim 5 or is coated with a solid sliding layer according to Claim 6.

The invention will now be described in more detail using an embodiment in combination with the drawing. The single figure of the drawing shows, in highly schematic representation, a cross section of

a drawing press including a multi-part drawing tool for forming a sheet metal blank.

The drawing press shown in open state in the drawing is used for non-cutting forming of higher strength steel and/or aluminum sheets and as its main components comprises a lower tool **2** with a forming pad that moves up and down and holds the hold-down device **6** and a pressing table **8** that can move in linear strokes with respect to the pressing pad **4**, on which the tool stamp **10** is mounted, as well as an upper tool **12** with the tool die **14** and the ejector **16**. To this extent, the drawing press is of the usual construction type.

In order to manufacture the parts **6**, **10** and **14** of the drawing tool, which are subject to wear, cost-effectively for sheet metal forming in a medium series range - from the point of view of passenger car construction - i.e., with service lives that lie at quantities between 1000 and 20,000 depending on the sheet metal type, these tool parts **6**, **10** and **14** are manufactured of a fine zinc alloy (Zamak) as base material and after the shape milling and final touchup they are provided with a surface coating **18** containing chrome that is applied using galvanic means in a layer thickness between 10 and 15 μm and contains over 99% pure chrome. Because of this, a surface hardness to over 70 Rockwell can be achieved. The coating process is set up in such a way that a surface structure with microfine roughening results and that the service life and forming behavior of the drawing tool **6**, **10**, **14** is improved. In order to further decrease the lubrication requirement, the galvanic coating **18** can additionally be provided with

a solid sliding layer 20 on sulfide or selenide basis, which is sprayed on the galvanic layer 18 atmospherically or applied by means of vacuum deposition.

The invention is not exclusively applicable to drawing tools, but also to other form tools, say also injection molding or diecast tools in the lower temperature range up to approx. 200°C.

Patent Claims

1. Form tool, especially multi-part drawing tool of a fine zinc alloy (Zamak), characterized in that the form tool is provided with a surface coating (18) of a material containing chrome applied to the Zamak material.

2. Form tool according to Claim 1, characterized in that the surface coating (18) is applied using galvanic means.

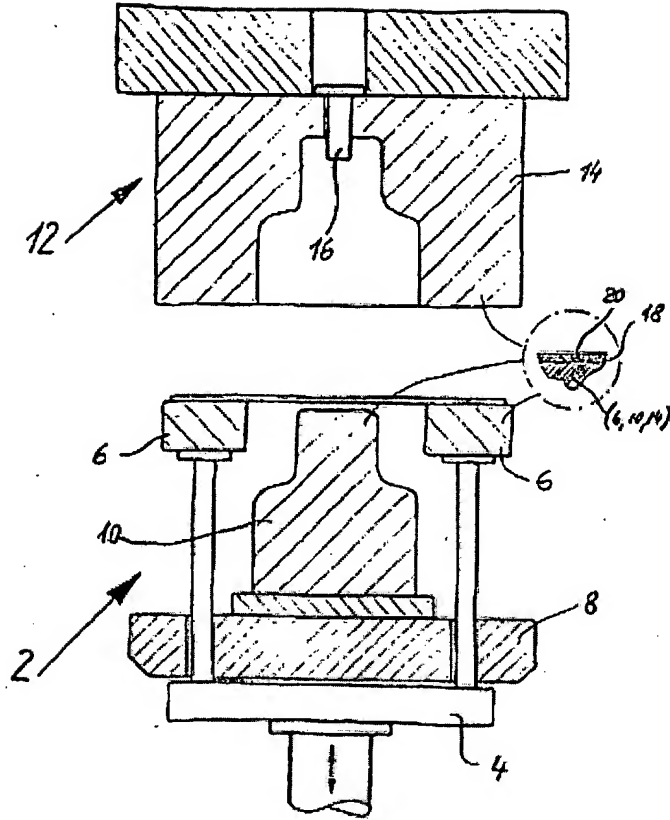
3. Form tool according to Claim 1 or 2, characterized in that the layer thickness of the surface coating (18) is between 10 and 15 μm .

4. Form tool according to one of the preceding claims, characterized in that the surface coating (18) has a pure chrome content of more than 90%.

5. Form tool according to one of the preceding claims, characterized in that the surface coating (18) has a micro-rough surface structure.

6. Form tool according to one of the preceding claims, characterized by an additional solid sliding layer (20) applied to the surface coating (20).

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